



001560-387.ST25

SEQUENCE LISTING

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Tanaka, Yoshikazu
Kasumi, Takaaki
Yoshikawa, Takafumi

<120> Genes Encoding Protein Having Citivity of Transferring
Sugar Onto Aurone

<130> 001560-387

<140> US 09/673,300

<141> 2000-10-16

<150> PCT/JP00/00876

<151> 2000-02-16

<150> JP 11-036801

<151> 1999-02-16

<160> 14

<170> PatentIn version 3.0

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<212> DNA

<213> Antirrhinum majus

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<223> Nucleotide sequence coding for a protein having glycosyl
transferase to aurone

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<222> (76)..(1518)

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gct cat ggt cac atg atc cca atg ttg gac atg gcc aag ctc ttt acc 159
Ala His Gly His Met Ile Pro Met Leu Asp Met Ala Lys Leu Phe Thr
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Ser Arg Gly Ile Gln Thr Thr Ile Ile Ser Thr Leu Ala Phe Ala Asp
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gtc tta tta caa gag cca gtt gag aag ctt atc gaa gaa cta aag ctc Val Leu Leu Gln Glu Pro Val Glu Lys Leu Ile Glu Glu Leu Lys Leu 95 100 105	399
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Lys	Glu	Met	Ala	Arg	Arg	Ala	Val	Glu	Glu	Gly	Gly	Ser	Ser	Tyr	Asn		
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Gly	Leu	Asn	Glu	Met	Ile	Glu	Asp	Leu	Ser	Val	Tyr	Arg	Ala	Pro	Glu		
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Lys	Gln	Asp	Leu	Asn													
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 35 40 45

Ala Arg Asp Ser Gly Leu Asp Ile Gly Leu Ser Ile Leu Lys Phe Pro
 50 55 60

Pro Glu Gly Ser Gly Ile Pro Asp His Met Val Ser Leu Asp Leu Val
 65 70 75 80

Thr Glu Asp Trp Leu Pro Lys Phe Val Glu Ser Leu Val Leu Leu Gln
 85 90 95

Glu Pro Val Glu Lys Leu Ile Glu Glu Leu Lys Leu Asp Cys Leu Val
 100 105 110

Ser Asp Met Phe Leu Pro Trp Thr Val Asp Cys Ala Ala Lys Phe Gly
 115 120 125

Ile Pro Arg Leu Val Phe His Gly Thr Ser Asn Phe Ala Leu Cys Ala
 130 135 140

Ser Glu Gln Met Lys Leu His Lys Pro Tyr Lys Asn Val Thr Ser Asp
 145 150 155 160

Thr Glu Thr Phe Val Ile Pro Asp Phe Pro His Glu Leu Lys Phe Val
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Arg Thr Gln Val Ala Pro Phe Gln Leu Ala Glu Thr Glu Asn Gly Phe
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Ser Lys Leu Met Lys Gln Met Thr Glu Ser Val Gly Arg Ser Tyr Gly
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Val Val Val Asn Ser Phe Tyr Glu Leu Glu Ser Thr Tyr Val Asp Tyr
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Tyr Arg Glu Val Leu Gly Arg Lys Ser Trp Asn Ile Gly Pro Leu Leu
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Ala Ile Gly Glu His Glu Cys Leu Ala Trp Leu Asn Ser Lys Lys Gln
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Asn Ser Val Val Tyr Val Cys Phe Gly Ser Met Ala Thr Phe Thr Pro
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Ala Gln Leu Arg Glu Thr Ala Ile Gly Leu Glu Glu Ser Gly Gln Glu
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Phe Ile Trp Val Val Lys Lys Ala Lys Asn Glu Glu Glu Gly Lys Gly
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Lys Glu Glu Trp Leu Pro Glu Asn Phe Glu Glu Arg Val Lys Asp Arg
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Pro Ala Val Gly Ala Phe Val Thr His Cys Gly Trp Asn Ser Thr Leu
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Glu Gly Ile Cys Ala Gly Val Pro Met Val Thr Trp Pro Val Phe Ala
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Glu Gln Phe Phe Asn Glu Lys Phe Val Thr Glu Val Leu Gly Thr Gly

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 Val Ser Val Gly Asn Lys Lys Trp Leu Arg Ala Ala Ser Glu Gly Val
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 Ser Arg Glu Ala Val Thr Asn Ala Val Gln Arg Val Met Val Gly Glu
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 Asn Ala Ser Glu Met Arg Lys Arg Ala Lys Tyr Tyr Lys Glu Met Ala
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Gln Pro His Phe Val Leu Leu Pro Phe Met Ala Gln Gly His Thr Asn
10 15 20

ccc atg att gac atc gca cgc cta ttg gca caa cgc gga gtt ata atc 149
Pro Met Ile Asp Ile Ala Arg Leu Leu Ala Gln Arg Gly Val Ile Ile
25 30 35

acc att ctt act aca cac ttt aat gcc act aga ttc aag aca gtc gtt 197
Thr Ile Leu Thr Thr His Phe Asn Ala Thr Arg Phe Lys Thr Val Val
40 45 50

gat cgg gca gta gtg gca gca cta aag att cag gta gtt cac ctc tat 245
Asp Arg Ala Val Val Ala Ala Leu Lys Ile Gln Val Val His Leu Tyr
55 60 65 70

ttt cca agc tta gag gct gga cta cct gaa ggg tgt gaa gct ttc gac 293
Phe Pro Ser Leu Glu Ala Gly Leu Pro Glu Gly Cys Glu Ala Phe Asp
75 80 85

atg ctt cct tca atg gat ttc gca atg aaa ttc ttt gat gct acc agt	341
Met Leu Pro Ser Met Asp Phe Ala Met Lys Phe Phe Asp Ala Thr Ser	
90 95 100	
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Arg Leu Gln Pro Gln Val Glu Glu Met Leu His Glu Leu Gln Pro Ser	
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cca agt tgc ata ata tct gat atg tgt ttt cca tgg aca act aat gtt	437
Pro Ser Cys Ile Ile Ser Asp Met Cys Phe Pro Trp Thr Thr Asn Val	
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Phe Ser Leu Leu Cys Leu His Asn Leu Arg Asp Trp Lys Glu Leu Glu	
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Ser Asp Ile Glu Tyr Phe Gln Val Pro Gly Leu His Asp Lys Ile Glu	
170 175 180	
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Leu Asn Lys Ala Gln Leu Ser Asn Ile Val Lys Pro Arg Gly Pro Asp	
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Trp Asn Glu Phe Ala Asp Gln Leu Lys Lys Ala Glu Glu Glu Ala Tyr	
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Gly Leu Glu Lys Ala Lys Gly Leu Lys Ile Trp Pro Ile Gly Pro Val	
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280 285 290	
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Thr Pro Gln Met Ile Glu Leu Gly Leu Gly Leu Glu Ser Ser Lys Arg	
295 300 305 310	
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Gln	Val	Ser	Lys	Asp	Asp	Ile	Lys	Met	Val	Ile	Glu	Arg	Val	Met	Gly		
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Leu	Thr	Gln	Leu	Ile	Gln	Asp	Val	Thr	Glu	Gln	Ala	Asn	Ile	Leu	Lys		
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Ser	Ile																
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 35 40 45

Arg Phe Lys Thr Val Val Asp Arg Ala Val Val Ala Ala Leu Lys Ile
 50 55 60

Gln Val Val His Leu Tyr Phe Pro Ser Leu Glu Ala Gly Leu Pro Glu
 65 70 75 80

Gly Cys Glu Ala Phe Asp Met Leu Pro Ser Met Asp Phe Ala Met Lys
 85 90 95

Phe Phe Asp Ala Thr Ser Arg Leu Gln Pro Gln Val Glu Glu Met Leu
 100 105 110

His Glu Leu Gln Pro Ser Pro Ser Cys Ile Ile Ser Asp Met Cys Phe
 115 120 125

Pro Trp Thr Thr Asn Val Ala Gln Lys Phe Asn Ile Pro Arg Leu Val
 130 135 140

Phe His Gly Met Cys Cys Phe Ser Leu Leu Cys Leu His Asn Leu Arg
 145 150 155 160

Asp Trp Lys Glu Leu Glu Ser Asp Ile Glu Tyr Phe Gln Val Pro Gly
 165 170 175

Leu His Asp Lys Ile Glu Leu Asn Lys Ala Gln Leu Ser Asn Ile Val
 180 185 190

Lys Pro Arg Gly Pro Asp Trp Asn Glu Phe Ala Asp Gln Leu Lys Lys
 195 200 205

Ala Glu Glu Glu Ala Tyr Gly Ile Val Ala Asn Ser Phe Glu Glu Leu
 210 215 220

Glu Pro Glu Tyr Val Lys Gly Leu Glu Lys Ala Lys Gly Leu Lys Ile
 225 230 235 240

Trp Pro Ile Gly Pro Val Ser Leu Cys Asn Lys Glu Lys Gln Asp Lys
 245 250 255

Ala Glu Arg Gly Asn Lys Ala Ser Ile Asp Glu His Gln Cys Leu Lys
 260 265 270

Trp Leu Asp Ser Trp Gly Ala Asn Ser Val Leu Phe Val Cys Leu Gly
 275 280 285

Ser Leu Ser Arg Leu Pro Thr Pro Gln Met Ile Glu Leu Gly Leu Gly
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Leu Glu Ser Ser Lys Arg Pro Phe Ile Trp Val Val Arg His Lys Ser
 305 310 315 320

Asp Glu Phe Lys Ser Trp Leu Val Glu Glu Asn Phe Glu Glu Arg Val
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Lys Gly Gln Gly Leu Leu Ile His Gly Trp Ala Pro Gln Val Leu Ile
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Leu Ser His Thr Ser Ile Gly Gly Phe Leu Thr His Cys Gly Trp Asn
 355 360 365

Ser Ser Val Glu Gly Ile Ser Ala Gly Val Pro Met Ile Thr Trp Pro
 370 375 380

Met Phe Ala Glu Gln Phe Cys Asn Glu Arg Leu Ile Val Asn Val Leu
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caa gaa cca ctt gag cag ctt att gaa gaa tgt cat ccc aat tgt ctt Gln Glu Pro Leu Glu Gln Leu Ile Glu Glu Cys His Pro Asn Cys Leu 100 105 110	452
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act aga aca caa ttg tct ccg ttt gag caa tca ttg gaa gag aca cca Thr Arg Thr Gln Leu Ser Pro Phe Glu Gln Ser Leu Glu Glu Thr Pro 180 185 190	692
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cat tat acc aag gtt ctt ggt aga aag tct tgg gct att ggc ccg ctt His Tyr Thr Lys Val Leu Gly Arg Lys Ser Trp Ala Ile Gly Pro Leu 230 235 240	836
tct ttg tgc aat agg gac att gaa gat aaa gct gaa aga ggg aag att Ser Leu Cys Asn Arg Asp Ile Glu Asp Lys Ala Glu Arg Gly Lys Ile 245 250 255	884
tcc tct att gat aaa cat gag tgt ttg aat tgg ctt gat tca aag aaa Ser Ser Ile Asp Lys His Glu Cys Leu Asn Trp Leu Asp Ser Lys Lys 260 265 270	932
cca agt tcc att gtt tat gtt tgc ttc ggg agc gta gca gat ttc act Pro Ser Ser Ile Val Tyr Val Cys Phe Gly Ser Val Ala Asp Phe Thr 275 280 285	980
gca gca caa atg cgt gaa ctt gca ttg gga att gaa gca tct gga caa	1028

Ala Ala Gln Met Arg Glu Leu Ala Leu Gly Ile Glu Ala Ser Gly Gln 290 295 300 305	
gaa ttc att tgg gct gtt aga aga ggc aaa gag gaa caa gac aat gaa Glu Phe Ile Trp Ala Val Arg Arg Gly Lys Glu Glu Gln Asp Asn Glu 310 315 320	1076
gag tgg ttg cct gaa gga ttc gag gaa aga acg aaa gaa aaa ggt cta Glu Trp Leu Pro Glu Gly Phe Glu Glu Arg Thr Lys Glu Lys Gly Leu 325 330 335	1124
att att aga gga tgg gcg ccc caa gtg cta att ctt gat cac caa gct Ile Ile Arg Gly Trp Ala Pro Gln Val Leu Ile Leu Asp His Gln Ala 340 345 350	1172
gtg gga gct ttt gtc act cat tgt ggt tgg aat tca acg ctt gaa gga Val Gly Ala Phe Val Thr His Cys Gly Trp Asn Ser Thr Leu Glu Gly 355 360 365	1220
gta tca gca ggg gtg cct atg gtg acc tgg cct gtg ttt gca gag caa Val Ser Ala Gly Val Pro Met Val Thr Trp Pro Val Phe Ala Glu Gln 370 375 380 385	1268
ttt ttc aat gaa aag ttg gtg act gag gtt ttg aga act ggg gct ggt Phe Phe Asn Glu Lys Leu Val Thr Glu Val Leu Arg Thr Gly Ala Gly 390 395 400	1316
gtt ggt tca atg caa tgg aaa aga tca gct agc gag gga gta aaa agg Val Gly Ser Met Gln Trp Lys Arg Ser Ala Ser Glu Gly Val Lys Arg 405 410 415	1364
gaa gca ata gct aag gca ata aag aga gtc atg gtg agt gaa gaa gca Glu Ala Ile Ala Lys Ala Ile Lys Arg Val Met Val Ser Glu Glu Ala 420 425 430	1412
gag gga ttc aga aac cga gct aaa gcc tac aaa gag atg gca aaa caa Glu Gly Phe Arg Asn Arg Ala Lys Ala Tyr Lys Glu Met Ala Lys Gln 435 440 445	1460
gct att gaa gaa gga gga tct tct tac tct gga ttg act act ttg cta Ala Ile Glu Glu Gly Gly Ser Ser Tyr Ser Gly Leu Thr Thr Leu Leu 450 455 460 465	1508
caa gat ata agt aca tat agt tcc aaa agt cat taactgcaca actaaaaaaaa Gln Asp Ile Ser Thr Tyr Ser Ser Lys Ser His 470 475	1561
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Lys Ala Thr Ile Ile Thr Thr Pro Leu Asn Glu Ser Val Phe Ser Lys
 35 40 45

Ala Ile Glu Arg Asn Lys His Glu Ile Asp Ile Arg Leu Ile Lys Phe
 50 55 60

Gln Ala Val Glu Asn Gly Leu Pro Glu Gly Cys Glu Arg Ile Asp Leu
 65 70 75 80

Ile Pro Ser Asp Asp Lys Leu Ser Asn Phe Leu Lys Ala Ala Met
 85 90 95

Met Gln Glu Pro Leu Glu Gln Leu Ile Glu Glu Cys His Pro Asn Cys
 100 105 110

Leu Val Ser Asp Met Phe Leu Pro Trp Thr Thr Asp Thr Ala Ala Lys
 115 120 125

Phe Asn Ile Pro Arg Ile Val Phe His Gly Thr Ser Phe Phe Ala Leu
 130 135 140

Cys Val Glu Asn Ser Asn Arg Thr Asn Lys Pro Phe Lys Asn Val Ser
 145 150 155 160

Ser Asp Ser Glu Thr Phe Val Val Pro Asn Leu Pro His Glu Ile Arg
 165 170 175

Leu Thr Arg Thr Gln Leu Ser Pro Phe Glu Gln Ser Leu Glu Glu Thr
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Pro Met Ser Arg Met Ile Lys Ala Val Arg Glu Ser Asp Ala Lys Ser
 195 200 205

Tyr Gly Val Ile Phe Asn Ser Phe Tyr Glu Leu Glu Ser Asp Tyr Val
 210 215 220

Glu His Tyr Thr Lys Val Leu Gly Arg Lys Ser Trp Ala Ile Gly Pro
 225 230 235 240

Leu Ser Leu Cys Asn Arg Asp Ile Glu Asp Lys Ala Glu Arg Gly Lys
 245 250 255

Ile Ser Ser Ile Asp Lys His Glu Cys Leu Asn Trp Leu Asp Ser Lys
 260 265 270

Lys Pro Ser Ser Ile Val Tyr Val Cys Phe Gly Ser Val Ala Asp Phe
 275 280 285

Thr Ala Ala Gln Met Arg Glu Leu Ala Leu Gly Ile Glu Ala Ser Gly
 290 295 300

Gln Glu Phe Ile Trp Ala Val Arg Arg Gly Lys Glu Glu Gln Asp Asn
 305 310 315 320

Glu Glu Trp Leu Pro Glu Gly Phe Glu Glu Arg Thr Lys Glu Lys Gly
 325 330 335

Leu Ile Ile Arg Gly Trp Ala Pro Gln Val Leu Ile Leu Asp His Gln
 340 345 350

Ala Val Gly Ala Phe Val Thr His Cys Gly Trp Asn Ser Thr Leu Glu
 355 360 365

Gly Val Ser Ala Gly Val Pro Met Val Thr Trp Pro Val Phe Ala Glu
 370 375 380

Gln Phe Phe Asn Glu Lys Leu Val Thr Glu Val Leu Arg Thr Gly Ala
 385 390 395 400

Gly Val Gly Ser Met Gln Trp Lys Arg Ser Ala Ser Glu Gly Val Lys
 405 410 415

Arg Glu Ala Ile Ala Lys Ala Ile Lys Arg Val Met Val Ser Glu Glu
 420 425 430

Ala Glu Gly Phe Arg Asn Arg Ala Lys Ala Tyr Lys Glu Met Ala Lys

435

440

445

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